DESIGN STANDARDS FOR CONFINED FEEDING FACILITIES

Kansas Department of Health & Environment
Bureau of Water
Livestock Waste Management Section
Topeka, Kansas

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I. Introduction

This document has been prepared consistent with Kansas Statutes Annotated (K.S.A.) 65-171h, which authorizes and empowers the Secretary of Health and Environment to "develop, assemble, compile, approve, and publish minimum standards of design, construction, and maintenance of sanitary water and sewage systems." The level of environmental protection contained herein is consistent with the requirements of State and Federal laws and regulations and reflect the responsibility of the Department to the users of the waters of the State. These Design Standards consist mainly of principles and requirements, which have been in use over an extended period of time in animal waste management systems found throughout Kansas. These standards supersede previous versions known as the "Design Standards for Confined Livestock Feeding Operations."

These Design Standards provide the minimum requirements for animal waste management systems for newly proposed confined feeding facilities subject to Kansas Department of Health and Environment (KDHE) approval. These standards also apply to all expansions of existing facilities subject to approval by KDHE. These standards do not apply to those portions of the facility in existence or approved prior to the adoption of these standards unless the existing portion is being modified or changed. KDHE should be notified early in the planning process whenever modifications to existing components of a confined feeding facility are being considered. Early coordination with KDHE will minimize the potential for redesign of the modifications.

These Design Standards are based upon the climate, topography, geology, management practices and waste utilization of Kansas in order to achieve a desirable level of protection for public health and the environment. The typical animal waste system has four components: 1) waste production, 2) waste collection, 3) temporary storage and/or treatment, and 4) waste utilization. Each area has its own set of criteria to be considered for each and every site.

When preparing design reports, summaries and information, consultants may use book values from accepted reference publications; however, the information used must be the most up to date information from the publication. Each book value used shall be referenced and fully footnoted where cited in the design documents.

The Kansas Agricultural and Related Waste Control/NPDES permit does not relieve the facility or permittee from complying with any other applicable federal, state, or local requirements. There may be other federal, state and local permits required; e.g. water rights, water structures, animal health, 404-discharge of dredge material, wetlands, threatened & endangered species, local building and zoning permits, etc. Some other Kansas agencies often involved with confined feeding facilities include: the Kansas Department of Agriculture for water rights, stream obstructions, floodplain management, and dam safety - the Kansas Animal Health Department for feedlot licensing animal transport, animal carcass transport, animal carcass rendering - and the KDHE Watershed Management Program, 401 Certification for U.S Corp of Engineers 404 permits.

It is the intent of the Department that these Design Standards provide designers with the maximum amount of design freedom consistent with modern standards for the management of animal and process wastes. The Department recognizes that each animal waste management system is unique and that changes to these standards may be necessary to meet site-specific conditions or unusual circumstances. No provision of these standards, nor any decision made by KDHE staff pursuant to these standards, shall alter the responsibilities or duties of any licensee of the Kansas board of

technical professions or any persons to comply with the requirements of the board and of K.S.A. 74-7001 *et seq.*

Terms such as "should" or "recommend" indicate the criterion or guideline is important and is to be given due consideration, but also indicates the Department acknowledges that site-specific deviations may be necessary. On the other hand terms such as "must" and "shall" are used where a design practice has been sufficiently developed to delineate it as a requirement or where safeguarding of the public health and environment justifies a definitive action. Even the terms "shall" and "must" are not absolutes in that the Design Standards have also provided flexibility for new, innovative or equivalent technology through the variance process (refer to Section VIII, Variance Procedure). These Design Standards are not intended to restrict the development or use of innovative ideas, new products, or methods meeting the same intent of the requirement.

The words, phrases, and abbreviations used herein shall have the meaning as provided in Kansas Administrative Regulation (K.A.R.) 28-18-1 et seq. and K.A.R. 28-18a-1 et seq. unless a different meaning is clear from the context in which it is used. In the event of any conflict between these Design Standards and the regulations and statutes upon which the Standards are based, the most stringent reading shall apply unless the Standard negates the intent of the regulation or statute.

Confined feeding facility shall have the meaning provided in K.S.A. 65-171d except as used herein it shall also include the waste control and retention system. Statutes, regulations, standards, or other documents cited or referenced herein shall be the most current version unless otherwise specified.

II. Facility and Project Description, Plans and Specifications

A complete permit application is required to be submitted or addressed. A complete permit application shall address each item either in the affirmative, in the negative, or with explanation. If an item is not applicable to the facility or project, then the permit applicant shall ensure the completed permit application indicates the item does not apply. A permit application with unanswered questions, sections, or blanks will be returned to the applicant. Contact the Department if there is any question as to whether or not the information should be included.

The permit application, design information, and any subsequent revisions should be submitted as a complete set of documentation in an organized format. The material should be bound and should include a cover letter describing the material being submitted. The design materials should consist of several sections providing complete information on the project or facility. The following information shall be included as a minimum.

A. General

This section of the Design Standards outlines the documentation required for plans and specifications submitted to the Department for review. Plans and specifications include: A) narratives describing: 1) the basis of design, 2) the proposed construction, and 3) the operation and management of the waste control system and waste utilization/disposal system for the confined feeding facility; B) calculations, C) drawings, D) construction details, and E) specifications. The name, firm address, phone number and signature of the designer shall be included. Four copies of all documents shall be submitted.

There shall be no significant deviation from the plans approved by the Department unless

amended plans showing the proposed changes are submitted and approved. The designer should consider incorporating an advisory statement in the plans to minimize the potential that the designers plans would be inadvertently modified during construction in the event the designer is not retained through the construction period.

1. Changes in Design

   A significant deviation or change includes:

   Expansion or enlargement of the facility beyond the scope or boundaries established by registration, permit, certification or approved plans and specifications;

   Any increase in the animal unit capacity beyond that authorized by a permit or certification; or

   Any change in construction or operation of a confined feeding facility that may affect the collection, storage, handling, treatment, utilization, or disposal of animal or other process wastes.

B. Narrative

The narrative includes the description of the confined feeding facility operation, both existing and planned and includes such items as: buildings, pens or lots, the waste control system design and components (basins, ponds, etc.), the operation and maintenance necessary to conform with the design, and the manure or waste utilization plans. Any preliminary short and/or long term plans for expansion or phased construction should be included. The information provided by the permit applicant shall address the facility in its entirety and shall show that the design of the facility as a whole conforms to these design standards. Where appropriate, the permit applicant may provide specific references to existing plans or documents approved and on file with the Department.

1. Confined Feeding Facility

   This section is a general description of the confined feeding facility and how it should be operated. It includes a description of the type of livestock, maximum head to be present at any given time, average weight or weight range of the animals, production cycles, confinement time, driving directions to the facility using the most accessible route from a federal or state numbered highway, and the type(s) of animal and process wastes produced. A description of the entire (existing and proposed) animal waste management system shall be included.

2. Animal Waste Management System Design

   This section consists of the waste control system design calculations and related documentation necessary to show the design of the facility, as a whole, conforms to these design standards and the statutes and regulations related to the management of animal wastes. Items to be included are:

   a. Storage Volume Required

      Calculations documenting the design storage volume necessary shall be provided. The calculations shall address and account for all process wastes as defined in K.A.R. 28-18-1 and 28-18a-1 and sediments accumulated during the

life of the waste control system. Process waste volumes should be based upon site-specific information. In the absence of site-specific information book values may be used. However, in the absence of site-specific information for process wastes from continuous overflow watering systems, a value of one-quarter (¼) gallon per minute for eight hours of each day for each waterer shall be used.

All facilities designed to have a biological treatment volume shall include calculations used to determine the necessary volume.

b. Storage Volume Provided

Calculations documenting the proposed or designed waste storage system(s) actually provide the volume required as in the previous section. A stage/storage table showing the elevation, water surface area at that elevation, volume for that interval and cumulative storage volume at that elevation shall be included. The elevation increment or depth increment for the stage/storage table shall be the same as the contour interval used to show the topography of the waste control system site. For waste control structures with uniform sideslopes the depth increment of the stage/storage table should be expanded to show one-half (½) foot increments.

The Department will establish a minimum routine operating level (pump out level) and a minimum December 1 operating level. The levels are based upon the elevations in the stage-storage table corresponding with the level necessary to meet or exceed the required storage volume.

The levels will be set at the next increment elevation that corresponds with or is greater than the required volume in the stage-storage table provided by the designer. Therefore the designer should consider providing small increments in the stage/storage table to avoid causing the operator to pump extra wastewater volumes. This consideration becomes more important when the ratio of the change in surface area at each interval to the surface area at that interval becomes large.

c. Runoff/Evaporation Values

The amount of precipitation associated with the design storm; surface areas, drainage areas, evaporation values, runoff values, etc. used to calculate the volume of direct rainfall on any retention structures, retention structure evaporation volumes and storm water runoff volumes.

d. Subsurface Investigation Report

Driller's/Geologist's logs of test borings from the site(s), results of any permeability testing of the soil and any laboratory recommendations for soil amendments, and depth to groundwater information.

3. Operation and Utilization Plan

This section only applies to those facilities that are not required to develop and implement a Nutrient Management Plan [generally those facilities with less than 1,000 animal units]. In lieu of providing the information below in narrative form the permit applicant may complete the Manure/Waste Management Plan form available from the Department. The form can be used to replace, complete or supplement a site specific Manure Waste Management Plan for the facility.

a. Operation and Maintenance

This section of the narrative provides operation and maintenance information on each system component. The section indicates how the waste control structures are to be operated. Minimum routine operating levels and if applicable, minimum December 1 operating levels should be addressed or the permittee shall acknowledge that the operating level requirements contained in their permit will be followed. Maintenance descriptions for activities such as sediment removal, equipment operation, mowing and maintenance of vegetation, vermin control and dead animal handling/disposal are items that shall be included.

b. Manure/Waste Utilization

This section provides details on how wastes will be managed and utilized after production and storage. Items that shall be included are:

i. Type(s) of waste(s) applied (solid, slurry, liquid).

ii. Application method used (e.g. mechanical spreading, tank wagon, sprinkler, center pivot, etc.).

iii. Estimated frequency of, and rate of, waste application.

iv. Waste incorporation practices.

v. Practices or methods used to prevent pollutants from entering the waters of the state.

vi. Application area required to dispose of the facility wastes as well as the total application area available, including location as described by the Public Land Survey System.

vii. How the permittee anticipates using the compost from any manure and dead animal composting operations.

4. Nutrient Management Plan

This section applies only to facilities required by regulation or permit condition to develop and implement a Nutrient Management Plan. Regulation requires Large CAFOs (generally facilities with 1,000 or more animal units) to develop and implement a NMP.

The Nutrient Management Plan shall be prepared in accordance with the latest

edition of the Kansas Technical Standard – Nutrient Management.

All applicants for swine facilities with 1,000 or more animal units must submit a Manure Management Plan (MMP), Dead Swine Handling Plan (DSHP) and Nutrient Utilization Plan (NUP) as required in Kansas Statutes and Administrative Regulations. These plans are considered a portion of the materials needed to meet the requirement of a Nutrient Management Plan meeting the Kansas Technical Standard. In addition to the NUP, DSHP, and MMP, each swine facility required to develop a NMP shall submit the remaining materials needed to meet the Kansas Technical Standard for Nutrient Management.

5. Subsurface Monitoring Plan

Each facility required by the Department and each swine facility with an animal units capacity of 3,725 or more required by K.S.A. 65-1,181 to develop and implement a subsurface or groundwater monitoring plan shall develop the plan for approval by the Department before implementing the plan. The subsurface monitoring plan shall be submitted with the permit application or as requested by the Department.

a. Considerations Affecting the Decision to Require Subsurface Monitoring

The Department shall consider the following information prior to making a decision to require subsurface monitoring at any confined feeding facility.

i. Soil type

ii. Depth to groundwater

iii. Geologic setting

iv. Surrounding land and water uses

v. Waste and liner characteristics

vi. Land application practices, and

vii. Any other factors related to public health and the environment, as appropriate.

b. Information Sources

The permit applicant's subsurface monitoring plan may use groundwater monitoring wells, soil borings, direct push technology, existing wells with a design suitable for the purpose of monitoring groundwater, or any other equivalent technology accepted or approved by the Department.

c. Plan Contents

i. Each subsurface monitoring plan shall include a narrative, site map, drawings and standard details addressing but not limited to the following:

(I) A general description of the physical and geologic setting of the facility site, including any existing wells and their use,

(II) A description and summary of any previous subsurface monitoring efforts,

(III) The proposed location and design of each monitoring well or test and site,

(IV) Well development procedures for any groundwater monitoring well,

(V) The procedure for any subsurface investigations,

(VI) Initial baseline or background testing parameters,

(VII) Routine testing parameters,

(VIII) Sampling frequency initial and long term,

(IX) A quality assurance plan addressing techniques and procedures for the subsurface investigations including determining groundwater levels, purging wells, collecting and preserving samples and laboratory testing.

d. Certified Laboratory

All sample testing will be performed at a laboratory certified by KDHE for the parameters being evaluated.

e. Format

Each subsurface monitoring plan shall contain a format for describing each type of subsurface investigation and a format for reporting the results of the sampling and testing.

f. Licensing

Each well to be installed upon implementation of the plan shall be installed by a driller licensed in Kansas in conformance with regulations adopted pursuant to the Kansas Groundwater Exploration and Protection Act, K.S.A. 82a-1201 *et seq.* and K.A.R. Agency 28, Article 30.

g. Baseline Sampling

Each plan shall specify the following timeframes for obtaining initial or baseline samples from each subsurface monitoring location or well:

i. For each new facility, prior to stocking the facility with livestock,

ii. For each existing facility, within two months of the installation of the subsurface monitoring equipment.

h. Data management

All sampling results, field notes, drilling logs, etc shall be maintained for the life of the facility. Upon closure of the facility the permittee shall provide the Department with the opportunity to keep the records.

6. Other Information

Information required by the permit application form shall also be presented in narrative form where appropriate. Such items as:

a. A description of the approximate location of the facility using the Public Land Survey System (Quarter Section, Section, Township, and Range).

b. A list of all land and habitable structure owners, including mailing addresses, within one mile of the facility boundary. The county appraisers office can generally supply this information. If possible the information should also be provided in digital/electronic form to allow mailing labels to be readily created.

c. If needed to meet separation distance requirements, copies of all habitable structure separation distance waivers showing the register of deeds seal and/or book and page where the waiver is recorded.

d. If needed to meet separation distance requirements, copies of all property line separation distance waivers.

e. A print out of all water, oil, and gas well information for the area within one mile of the facility boundary. Water well records within six hundred feet of the facility boundary shall be numbered or labeled and the corresponding label and location shown on the facility location map(s) and details and drawings.

f. Floodplain and flood elevation information and the source of the information.

g. For swine facilities Public Notice Documentation is required including a publisher's affidavit or proof of publication, and copies of return receipts from mailings to habitable structure owners and local officials.

C. Location Map

Map(s) shall be submitted which show the location and boundary of the confined feeding facility and waste control system. U.S.G.S. topographic maps and/or aerial photos with a scale of 1 inch = 2,000 feet (1:24,000) or a scale showing more detail are acceptable. The existing and proposed components or areas of the facility shall be shown and labeled.

In addition to the confined feeding facility and the waste control system, features such as those subject to separation distance requirements shall be shown on the map(s) (More than one map or drawing may be necessary to delineate the items listed.). These include, but are not limited to:

- Facility location in relation to all public roads, municipalities, communities, key features, etc. of the surrounding area (3 mile radius from the facility).
- Facility boundaries (include any areas anticipated for future expansion) and adjacent property lines.

- The location of each habitable structure within one mile of the facility boundaries. The habitable structures shall be identified as those within one mile of the boundary of the existing facility and those within one mile of the boundary of the proposed facility (K.A.R. 28-18-4 or 28-18a-4) Each habitable structure shall be labeled or footnoted to correspond to the mailing list contained in the permit application.
- All known water resources [active, abandoned and/or plugged water wells (some water well information is available from the Kansas Geological Survey WWC5 database {wells drilled after 1976} and WIZARD database), public water supply pipelines, reservoirs, streams, ponds, jurisdictional wetlands, etc.] within 600 feet of the facility boundary. Water wells shall be numbered or labeled to correspond with lists required as part of the Narrative (see pg. 8).
- The one hundred (100) year floodplain boundaries (if delineated by local, state, or federal agencies or by area records).
- All known active, abandoned, or plugged natural gas and oil wells and features such as pipelines, cables, railroads, highways, etc. within 600 feet of the facility boundary (oil and gas well information is available from the Kansas Geological Survey).
- The location of the area(s) the facility will use for waste utilization.

The property lines, water resources and other features listed above should be shown on the Drawings and Details plans of the confined feeding facility where they fall within the scale and sheet size of the drawing or detail.

D. Drawings and Details

1. Accuracy

Drawings and details for confined feeding facilities with an animal unit capacity of 1,000 or more animal units shall be based upon site surveys with an established accuracy standard such as the NRCS standards provided below or a similar standard.

NRCS STANDARD

Triangulation and Traverse	
Maximum error of angular closure	1.0 minute times the sq.rt. of N
Maximum error of horizontal closure	
Electronic	Suggestions
Chaining	1 in 5000
Stadia	1 in 1000
Leveling	
Maximum error of vertical closure	
Electronic	Suggestions
Level & rod	0.1ft times the sq.rt. of M
Transit and Stadia	0.3ft times the sq.rt. of M

Topographic

The elevation of 90 percent of all identifiable points shall be in error no more

than one-half contour interval. No point shall be in error more than a full contour interval.

N is the number of angles turned
M is the miles of level run

Confined feeding facilities designed for fewer than 1,000 animal units should consider using the above or similar accuracy standards.

2. Drafting Standards

The weight or thickness difference between structure lines and all other lines (dimension lines, etc.) shall be sufficient to clearly differentiate the structures.

Unless structure lines are clearly labeled with elevations all slopes in plan view shall include slope direction darts or indicators.

Each drawing shall include an information block containing the following sub-blocks: sheet number of total sheets, project name, sheet title or name, designer name, scale, date originally drawn, and revision dates. The information block shall be located at the bottom or the right or unbound end of the drawing. The sheet number block shall be in the lower or upper right corner of the drawing.

Drawing should be of standard size such as ANSI standard size sheets B (11 x 17) or D (24 x 34).

3. Plan Views

This consists of detailed drawing(s), with contour lines, showing the location(s) of all existing and proposed waste control components (lagoons, storage ponds, pits, tanks, sediment basins, channels, terraces, diversions, etc.) plotted to scale. The dimensions of all waste storage structures, except those portions utilizing existing natural features for containment, shall be shown. The inside perimeter dimensions (width, length, etc.) at the top and bottom of each structure shall be shown. The location of each boring and test hole shall also be plotted and labeled on plan view drawing(s). If proposed staff gauges are not plotted on the drawings, then the drawing shall note the staff gauge location is to be determined by owner and then installed by contractor.

Drawing scales shall be at least 1 inch = 200 feet. Scales of 1 inch = 50 or 100 feet, are recommended. A north arrow shall be shown on each plan view. Each scaled drawing shall include a bar scale. The boundary of the facility shall be shown on a drawing and at least one component of the waste control system shall be referenced to a Public Land Survey System section corner, permanent benchmark or permanently established reference point. The location of any permanent or temporary bench marks, or reference point used shall be shown on the drawings. A grid system should be considered for the facility layout however, if used, the grid shall be referenced to a permanent point of reference.

4. Cross Sections

Cross sections of all waste control system structures (lagoons, pits, ponds, tanks, sediment basins, diversions, etc.) shall be included as a part of the drawings. Depths or complete labeling of elevations, widths and side slopes, shall be shown. The original ground line shall also be shown. Any pipe spillway, chute or drop spillway or similar structure shall be shown along with pertinent elevations and grades. Permanent or temporary benchmarks may be used as elevation reference points. All elevations shall be relative to the referenced benchmark.

5. Profile Views

Profile views of diversions, collection channels, transfer pipes, etc., shall be included. The original ground line and its elevation shall be included. All elevations shall be relative to the referenced benchmark.

6. Detailed Views

Include detailed views of standardized components such as pipe inlets, outlets, staff gauges, cleanouts, etc.

E. Specifications

Written specifications shall be provided for each of the materials and construction methods and testing procedures pertaining to the proposed waste management system. The use of applicable standardized specifications developed by technical entities (for example: the American Society for Testing and Materials, the American Society of Agricultural and Biological Engineers, or the USDA Natural Resources Conservation Service) is acceptable provided the necessary specific details of the proposed facilities are included in the specifications to allow the use of the technical standard.

III. Site Location Considerations

A. General

Sites selected for confined feeding facilities must be located such that animal manure and runoff can be collected, stored, transported, and utilized in a manner that does not result in degradation of land or water resources. While protection of water quality is the paramount goal, the designer needs to understand there are specific requirements in statutes and regulations. The designer should become familiar with statutes and regulations addressing the location of a new confined feeding facility or expansion of an existing confined feeding facility. This section details the minimum separation distance requirements from habitable structures, property lines, water resources, and flood hazard areas. Unless otherwise noted, these requirements apply to each new confined feeding facilities and, to each expansion of an existing confined feeding facility where the expansion is beyond the scope or boundary of the existing confined feeding facility.

B. Separation Distances

1. Habitable Structures

a. General

For all species except swine, the separation distance shall be measured

from the perimeter of the new confined feeding facility or the expanded portion of the existing confined feeding facility to the closest habitable structure. For swine, the separation distance is measured to the closest non-owned habitable structure. Habitable structures are as defined in K.S.A 65-171d(c)(5).

b. Separation Distance Measurement

In the event the scaled distance between the confined feeding facility and the nearest habitable structure is within 100 feet of the required separation distance, or when requested by KDHE, the permit applicant or facility owner shall have the distance measured by a Licensed Land Surveyor. The measurement shall be made to property survey accuracy standards established by the American Congress of Surveying and Mapping and the distance, and the nearest points of the confined feeding facility perimeter and the habitable structure shall be drawn and plotted to scale on a drawing or plat. A land surveyor licensed to practice in the state of Kansas shall seal the drawing or plat.

The measurement point for each habitable structure shall be the exterior wall or corner that is nearest the confined feeding facility perimeter.

The measurement point for each new confined feeding facility and for the each expanded portion of an existing confined feeding facility shall be the side or point of the perimeter closest to the habitable structure.

For the purposes of determining separation distances "confined feeding facility perimeter" means, the outer limits of the following areas and facilities: buildings used for housing animals, open lots, waste management systems (outside toe of fill or outside top width of a cut), pen area access roads, pen area alleyways, and any areas designated in the permit application for future expansion. The following areas and facilities are not included in defining the perimeter of a confined feeding facility: feed mills, dwellings owned by the facility, the facility office, and each land application and waste utilization field owned or used by the facility.

c. Separation Distance Requirement Considerations

Habitable structure separation distance requirements are based upon each of the following:

i. Dates

(I) Whether or not the confined feeding facility was in existence on July 1, 1994 and the date the permit application was received by the Department

(II) Whether or not the habitable structure was in existence or authorized for constructions on the date the permit application was received by the Department

ii. Animal Unit Capacity

(I) The maximum permitted animal unit capacity of the confined feeding facility. Animal units are based on the species and other relevant factors and are as per K.S.A. 65-171d(c)(3), except that: Animal units for any chicken facility with a process waste management system, other than a liquid manure system, shall be calculated at 0.0122 animal units per head for laying hens and 0.008 animal units per head for chickens other than laying hens.

(II) Animal units for facilities with exotics (such as Ostriches, Emus, Llamas, Dogs, etc.) shall be calculated based on dividing the mature or finished animal body weight by 1,000 to obtain the animal unit per head.

d. Separation Distance Requirements

The minimum separation distance for each new confined feeding facility and each expansion of an existing confined feeding facility shall be as per K.S.A. 65-171d(h), (i), (j), and 65-1,194.

2. Separation Distances from Property Lines

A minimum separation distance of 100 feet shall be provided between property not owned by the facility and: 1) the perimeter of each new confined feeding facility, and 2) the perimeter of each expansion to an existing confined feeding facility.

When the confined feeding facility or expansion of an existing confined feeding facility is located adjacent to a roadway, access road, alleyway, or railroad with a permanent right-of-way or easement held or authorized by a unit of government, then the right of way opposite the confined feeding facility shall be the point of measurement. The distance measurement for all other roads shall be from the centerline of the road or the property line should the road be abandoned which ever is closer to the facility.

3. Separation Distances from Water Resources

a. Surface Water

Each new confined feeding facility and expanded portion of an existing confined feeding facility shall not be built in any stream, river, lake, reservoir, or jurisdictional wetland.

Surface water separation distance requirements do not apply to freshwater ponds that are wholly within the applicant's property.

i. All Species Except Swine

Each new waste storage structure and each expanded portion of an

existing waste storage structure, other than a swine waste management system, should have a separation distance between the structure and the nearest classified stream, as listed in the Kansas Surface Water Register of:

(I) 500 feet, if the confined feeding facility will have an animal unit capacity of 10,000 or more, or

(II) 250 feet, if the confined feeding facility will have an animal unit capacity of 1,000 to 9,999, or

(III) 100 feet, if the confined facility will have an animal unit capacity less than 1,000.

ii. Swine

Separation distances for each new swine waste management system and each expanded portion of an existing swine waste management system shall adhere to the stream separation distance requirements of K.S.A. 65-1, 180 and any amendments thereto.

b. Groundwater

Each new waste storage structure and each expanded portion of an existing waste storage structure shall meet the groundwater separation distance requirements established in K.A.R. 28-18-17 and 28-18a-33.

Each new waste storage structure and each expanded portion of an existing waste storage structure shall be a minimum of:

i. 1,000 feet from all publicly owned water supply wells considered to be part of a public water supply system (See K.A.R. 28-15a-2), and

ii. 100 feet from all other active wells used as a source of water (does not include monitoring wells).

c. Public Water Supply Systems

Each new retention structure for a confined feeding facility and each expanded portion of an existing retention structure for a confined feeding facility shall be located a minimum of 25 feet away from all public water supply system pipelines.

C. Flooding

1. Location

Unless protected from damage or inundation, each new confined feeding facility and each expanded portion of an existing confined feeding facility shall be located outside:

a. the 100-year floodplain (the area inundated by a flood having a 1% chance of

being equaled or exceeded in each year); or

b. in the event 100-year flood elevation is unknown, the Flood Hazard Boundary Area, as designated by FEMA; or

c. in the event FEMA Flood information unavailable, areas subject to flooding based upon documented local records, anecdotal information from the current or previous owner of the property or a flood analysis completed by a professional engineer.

2. Protection

a. Construction of a confined feeding facility or expanded portion of an existing confined feeding facility to the elevation one foot higher than the following levels shall be considered to be adequate protection from inundation:

i. the 100 year flood as determined by FEMA, or

ii. the level associated with local records of flooding at the facility site, or

iii. the level provided by the current or previous owner of the facility site.

D. Subsurface Investigation for Waste Storage Structures

1. Suitable and Sufficient Liner Materials

As part of the preliminary design stage for each waste retention structure and each expansion of an existing waste retention structure, that will be utilizing soil for the liner or sub liner, a subsurface investigation of the soils shall be conducted. The test holes or excavations shall be used to gather soil samples, including insitu samples if appropriate, for testing to determine the extent of the various soil layers. Samples of the soils anticipated to be used as the liner shall be collected, logged and prepared for testing. The samples must be representative of the materials to be used for the soil liner(s).

The soil samples shall be tested to determine the suitability of the soils selected and the specific construction techniques required to ensure seepage levels will be below levels established by regulation. These tests include, but are not limited to:

- moisture-density tests - to determine moisture and compaction requirements,
- soil amendment tests - including those to determine the amount of bentonite, chemical dispersant or other material needed to ensure seepage levels will be below levels established by regulation, and
- hydraulic conductivity testing of the soils at various moisture density values or hydraulic testing of soil samples obtained as insitu.

All testing shall be in accordance with standardized methods (for example, the American Standards and Testing Methods), commonly used by waste retention structure designers. A laboratory with experience and expertise with the test methods shall perform the tests. Use of a laboratory accredited to conduct the testing should be

considered. Example laboratory accreditation organizations include the American Association for Laboratory Accreditation and the National Institute for Standards and Technology.

A liner design must then be developed and documented. The design will specify the amount and type of amendment materials required, if any, the construction techniques required, the liner thickness (if greater than one foot), and the projected seepage rate.

The criteria described in paragraphs 2 through 7, below, shall be used to conduct the subsurface investigations for soil liner materials.

The testing to determine a soil liner design shall not eliminate the need for construction or post-construction testing to determine constructed seepage rate.

2. Test Methods

   Tests within the anticipated footprint of the waste storage structure shall use small diameter drilling, boring, or direct push methods. Tests outside the footprint of the waste storage structure shall be by the same methods or by excavated pit. Excavated test pits shall not be used within the projected footprint of the waste storage structure.

3. Number of tests

   a. The number of borings shall be based upon site-specific information such as the anticipated depth to groundwater and the degree of uniformity of the site materials. Sites with groundwater at depths less than 50 feet or with alluvial soils or cover sands should have more borings than sites with deeper groundwater or which have undergone uniform soil forming processes.

   b. A minimum of one boring is required regardless of the size of the waste storage structure.

4. Notification

   The designer shall notify the Department at least 2 workdays before beginning each subsurface investigation in order to provide an opportunity for the Department to observe the investigation.

5. Closing Test Holes/Excavations

   a. With the exception of each test hole and boring within the footprint of any waste storage structure, each investigation boring and excavation shall be filled or plugged in a manner to minimize the potential for the hole or boring to become a preferential path of flow for any seepage. Each test hole or boring within the footprint of the waste storage structure shall be plugged with bentonite.

6. Records

   The minimum requirements for subsurface investigations are:

   a. Logging all borings or investigations using the Unified Soil Classification System.

b. Recording the ground surface elevation and location of each boring. Elevation may be based upon project datum (benchmark).

c. If present, measuring and recording static groundwater levels after the levels have stabilized.

d. A brief summary of the investigation indicating the likely impacts the observed subsurface conditions may have on the design and performance of the waste storage structure.

7. Test Locations

When more than three tests are anticipated to be needed, the designer shall provide the Department with the opportunity to review the selection of the testing locations prior to performing the tests.

Consideration shall be given to locating the test sites outside the footprint of the waste storage structure, particularly for small waste storage structures. Location of the test outside the footprint will minimize the potential to create a preferential pathway where liquids could flow along the sides of the test hole.

8. Depth of testing

Site investigations for each new waste storage structure and each expansion of an existing waste storage structure will consist of borings or equivalent excavations to the following depths, or to the depth where consolidated materials such as rock formations occur, whichever is less:

a. Except for each swine waste management system with an animal unit capacity of less than 3,725, a depth of at least 15 feet below the lowest elevation of the proposed waste storage structure,

b. For each swine waste management system and each expansion of an existing swine waste management system with an animal unit capacity of 3,725 or more, a depth of at least 30 feet below the lowest elevation of the proposed swine waste management system.

9. Groundwater Determination

a. Moist soils

i. When fine-grained soils (silt or clay) predominate in the test boring or excavation, then the boring or excavation shall be left open, or temporarily cased, for a minimum of 24 hours to determine if there is static groundwater present. The Department may extend the required time frame for keeping the boring open depending upon the soil profile, and soil survey or lithology. Less permeable soils, will generally increase the time for keeping the boring or test pit open. If no water is observed after the required time period, a determination of "no groundwater" shall be entered on the log or record.

ii. When coarse grained (sand or gravel/soil mixture) soils predominate in the boring log, but water levels are not readily apparent, then a temporary casing shall be installed and the water level if any will be determined at least 24 hours after installation of the temporary casing.

b. Dry Cuttings

In the event the cuttings from the boring are dry, it is not required for the boring to be maintained open.

10. Depth to Groundwater

The designer may provide logging information from wells in the vicinity of each waste control structure to the Department as proof of local groundwater levels. Based upon the information provided and any site-specific conditions at the proposed location, the Department may require a subsurface investigation of the proposed site. Subsurface investigations to determine depth to groundwater can often be combined or conducted at the same time as subsurface investigations for locating suitable quantities of liner material. Site-specific subsurface investigations for each new waste storage structure and each expansion to an existing waste storage structure are necessary when:

a. the waste storage structure is to be located in a sensitive groundwater area,

b. the depth to groundwater in the immediate area is unknown,

c. the composition of the soil or subsoil at the location is unknown, or

d. other similar circumstances exist.

11. Retesting

In the event the final design of the waste storage structure is substantially deeper or larger than the preliminary design used for planning the subsurface investigation, then the Department may require retesting of the site prior to approval of the plans and specifications.

IV. Minimum Design of Wastewater Control Structures

A. General

The design storm for a facility is based upon the size of the facility and if applicable the federal effluent limitation guideline for the type of livestock at the confined feeding facility. The design storm to be used shall be based upon the following.

1. Non-Federal Permits

All facilities with a federal animal unit capacity of less than 1,000 shall use a 25-year, 24-hour storm for the basis of design.

2. Federal Permits

All facilities with a federal animal unit capacity of 1,000 or more shall use the criteria specified in 40 CFR 412 and summarized as:

- Swine, Poultry, and Veal Calves – 100-year, 24-hour storm
- Horses, Sheep, Dairy, and Beef – 25-year, 24-hour storm

Collection and storage systems shall be designed to contain and/or convey the design storm runoff from: (1) surface drainage from open lots, (2) manure and wastewater from confinement areas, and (3) other flows such as dry weather wastewater accumulations. The channels, ditches, berms, culverts, pipelines, dikes, terraces, pits, tanks, ponds, lagoons, and other devices used to contain and/or convey runoff and pollutants have site-specific design conditions. The collection and conveyance systems are to be designed to facilitate cleanout, convey daily and maximum flows, and minimize solids deposition.

Unpolluted extraneous drainage from areas adjacent to the confined feeding facility should be diverted away from the confined feeding facility. If extraneous drainage is not diverted away, the collection and storage system(s) must be sized to include these flows.

Runoff coefficients for areas contributing runoff to the waste control system shall be the coefficient associated with the type of feedlot surfaces unless there are extraneous drainage areas that are more than 10% of the area tributary to the process waste control structure. In which case the runoff factor shall be based upon site-specific information.

B. Open Channel Structures

All channels, ditches, berms, dikes, terraces, and diversions shall be designed to collect, and convey the larger of the peak discharge from the design storm event or the maximum daily process waste flow rate without overtopping or failure.

Velocities should be non-erosive at all design flow conditions, but high enough to minimize settling of solids in the structure. Each structure shall provide 0.5 foot of freeboard at the anticipated maximum flow rate. Earthen side slopes shall be 3 horizontal to 1 vertical (3:1) or flatter.

C. Closed Conduits

Culverts, pipes, and covered channels used to transfer runoff, sediment, and/or process wastes shall be sized to handle the larger of the peak flow from the design storm event or the peak process waste flow rate without causing infringement on the freeboard of other structures in the system. With the exception of conduits used for the collection of water from overflow watering systems, conduits shall be a minimum of 6 inches in diameter and have a minimum slope sufficient to create a velocity of 2 feet per second when the waste stream depth is one-half full of the conduit diameter. Consideration shall be given to a minimum diameter of 8 inches. Cleanouts shall be located at least every 200 feet for six-inch or smaller conduits and cleanouts or manholes shall be located every 400 feet for all larger size conduits. Cleanouts or manholes shall also be provided at all changes in direction and/or grade.

Conduit slopes should not exceed 10% unless provisions are made to anchor the conduit and to prevent erosion at the transition to a flatter grade or at the outlet. A permanent tailwater condition may be considered as an erosion protection measure if of sufficient depth. Designs that rely on tailwaters should consider measures which will prevent plugging of the conduit and which allow cleanout of the pipe or conduit (i.e. removal of sediment and waste

accumulations).

D. Basins and Structures

1. Sedimentation Structures

a. General

The purpose of sedimentation structures is to reduce solids/sludge accumulations in storage structures and facilitate the routine removal of solids/sludge from runoff and process wastes. These standards address two of the most common types of sediment basins, those for removing solids from feedlot runoff (runoff sediment basins) and those for removing solids from process wastes (process waste sediment basins) such as milking centers and swine barn flushes. All earthen structures shall have side slopes of 3 horizontal to 1 vertical (3:1) or flatter. Sedimentation basins shall have at least one-half (½) foot of freeboard at the design condition.

b. Sediment and Detention Basins

i. Each runoff sediment and detention basins shall:

(I) Have the capacity to detain rainfall and runoff in addition to sediment for the design detention period for the design storm.

(II) Have a minimum detention period of 4 hours for the design storm.

(III) Have a volume sufficient for the design sediment storage period. As a minimum, the volume allocated to storage of runoff sediment shall be the expected annual sediment yield.

(IV) Be designed using flood routing procedures to determine the required discharge rate and sediment basin volume to provide the design detention time. Weirs, orifices, or other devices may be used to control the discharge rate.

(V) Have a liner designed in accordance with Waste Retention Structure Liner requirements unless the runoff sediment basin is designed to completely dewater:

(A) Within 10 days of the conclusion of a design storm event, if located in areas other than those designated as Sensitive Groundwater Areas.

(B) Within 48 hours of the conclusion of the design storm event, if the runoff sediment basin is

located in a Sensitive Groundwater Area.

(VI) If designed with a closed conduit outlet, have an outlet capable of passing a sphere a minimum of 12 inches in diameter, unless the design includes an open channel emergency spillway leading to a waste retention structure.

(VII) If feasible, have an open channel spillway leading to a waste retention structure.

(VIII) Be designed to exclude process wastes (e.g. overflow waterer discharges).

ii. Process waste sediment basins

(I) Each process waste sediment basin shall be designed with multiple parallel units to allow routine removal from service for sediment drying and removal.

(II) Runoff should not be introduced or routed through any process waste sediment basins.

(III) Each process waste sediment basin should be sized in relation to the drying characteristics of the sludge, the anticipated weather conditions, the basin design characteristics effecting drying, and the projected time requirements for removal of the dried sediment. A minimum capacity of thirty days of process waste flows shall be provided.

(IV) Process waste sediment basins shall be lined in the same manner and to the same criteria as retention structures in order to minimize seepage. The design of each process waste sediment basin liner shall address the anticipated method of cleaning the basin. If heavy equipment will access the floor and sideslopes of the basin, then the liner design shall minimize the potential for liner damage from the heavy equipment.

(V) The width of each process waste sediment basin shall be based upon the capability of the equipment anticipated to be used to clean the basin. The area surrounding each process waste sediment basin shall be designed to allow access by the equipment to be used to clean the basin.

2. Liquid Waste Retention Structures

a. Earthen Retention Structures for Liquid Wastes

Each new waste retention structure and each expansion to an existing waste retention structure shall be designed to meet the following criteria.

i. Design components

(I) Embankment Foundation and Fill (does not include the liner)

The embankment berms of each new waste retention structure and each expansion to an existing waste retention structure shall have a minimum top width of ten (10) feet and shall be constructed of compacted soils essentially void of rock, gravel or sand layers or pockets, organic material, or other porous media.

Prior to the placement of any fill material, all vegetation shall be removed from foundation and fill areas.

Side slopes shall be 3 horizontal to 1 vertical (3:1) or flatter.

All embankments should include an allowance for settlement based on soil types and construction methods. A settlement allowance of at least 5 percent shall be provided.

(II) Emergency Spillway

Each new retention structure or expansion of an existing waste retention structure shall include an emergency spillway in the design, if:

Stormwater runoff (not including direct precipitation) is included in the basis of design; or

If an emergency spillway is required to meet Dam Safety Program requirements (Kansas Department of Agriculture, Division of Water Resources).

The crest of each emergency spillway shall be a minimum of one foot above the level associated with the total required design volume. Each emergency spillway shall be designed to meet the more stringent of these criteria:

(A) Dam Safety Program requirements; or

(B) Be capable of safely managing the 100-year, 24-hour storm from the contributing drainage area,

with the initial level of the retention structure at the total design volume level.

(III) Freeboard

Each new waste retention structure and each expansion of an existing waste management structure shall include a freeboard, or distance from the total design volume level to the lowest point of the top of the surrounding berms. The minimum freeboard shall be two feet. Each waste retention structure required to have an emergency spillway shall have a freeboard that is the depth of the spillway below the lowest point of the top of the surrounding berms plus one foot, but in no case less than two feet.

To minimize the potential for waves to overtop the waste retention structure berms, the designer is encouraged to provide an additional one to two feet of freeboard, in addition to the required freeboard

(IV) Erosion Protection

Each inlet and outlet shall be designed to provide the structure embankments and any retention structure soil liner from erosion. Splash pads, riprap, or other devices shall be provided as needed.

Structure embankments and any retention structure soil liner shall be protected from wave damage.

(V) Depths

(A) Maximum

The maximum design depth of liquid waste in each newly proposed wastewater retention structure shall not exceed 20 feet.

(B) Minimum

Each waste retention structure located in a Sensitive Groundwater Area shall have a minimum depth of three feet.

Each waste retention structure designed to have a biological volume shall have a minimum design depth of 8 feet.

(VI) Depth Gauge

A wastewater level measurement device (staff gauge) shall be installed in each retention structure that is used

to meet the design storage volume requirement. Retention structures used for supplemental storage need not be equipped with a water level measurement device.

Interconnected retention control structures where the water levels are always the same only need to have one depth gauge.

Each device shall be:

(A) Constructed of durable material capable of withstanding freeze/thaw reactions,

(B) Capable of withstanding forces from shifting ice, waves, etc.,

(C) Permanently marked with a graduated scale readable from the waste retention structure berm to an accuracy of six inches,

(D) Marked with zero to coincide with the lowest point of the top of the surrounding structure berms excluding the level of any emergency spillway.

(VII) Waste Retention Structure Liner

(A) General

The soils information gathered in the preliminary design stages shall be used as the basis for the liner design.

The designer and owner of each waste control system with a capacity of 10,000 or more head should consider developing and implementing a Construction Quality Assurance Plan.

Where consolidated materials such as a rock layer are encountered during the construction of any waste control structure utilizing an impermeable synthetic membrane liner and any waste retention structure utilizing a constructed soil liner, each area of unsuitable material shall be over excavated to remove the undesirable material. The over excavation shall be backfilled with compacted soil liner or synthetic liner sub grade material meeting liner or subgrade specifications

(1) Soil Liners, constructed and insitu

(a) General

Soil liners shall extend to an elevation of at least one (1) foot above the freeboard level unless erosion or liner integrity measures are substituted, in which case the soil liner level can be reduced to the freeboard level. Example erosion and liner integrity measures include: rip rap, a thicker soil liner in the area between the minimum routine operating level and the free board level, or lining the slopes with synthetic membrane liner material.

Soil liners shall be covered with six inches of soil or equivalent measures to minimize the potential for the formation of areas of high seepage due to the drying and cracking of the liner.

Constructed Soil Liners shall have a finished thickness of at least one (1) foot.

(2) Impermeable Synthetic Membrane Liners

An impermeable synthetic membrane liner (ISML) shall be installed when:

(a) required by regulation,

(b) seepage cannot be reduced to a level below that established by regulation, and/or

(c) required by the Department.

Each ISML shall extend over the bottom and side slopes of the interior of the waste retention structure and shall be designed and installed in a manner that will prevent seepage for the life of the waste retention structure. The permit applicant should consider a manufacturer and installation contractor warranty as part of the liner

selection and installation process.

ii. Design Volume

An individual or a combination of waste retention structures shall provide the total design volume. Freeboard shall be provided in addition to the total design volume. The total design volume is the sum of the following mandatory and optional sub-volumes associated with various process waste sources and the design of the waste retention structure:

- Sediment from runoff and sludge accumulated from organics – mandatory;
- Protection against liner drying and cracking– mandatory to be evaluated for facilities located in Sensitive Groundwater Areas that receive only stormwater runoff;
- Dry weather flows for 120 day period of reduced land application opportunities – mandatory;
- Net precipitation and runoff for during the 120 day period of reduced land application opportunities – mandatory;
- Runoff from a design storm precipitation event at the facility, including extraneous runoff, and direct rainfall on the waste retention structure – mandatory;
- Biological activity volume – optional but encouraged to be included in process waste dominated waste systems; and
- Evaporation losses – optional.

(I) Sediment and Sludge Accumulation

Each waste retention structure receiving runoff other than direct precipitation shall provide for the volume of sediment generated in a 10-year period from the contributing drainage area. As an alternative to site specific calculations, if a sediment basin precedes the waste retention structure, the sediment accumulation shall be calculated at 0.5 acre-inches per acre of area drained. Or, if there is no sediment basin preceding the waste retention structure, a minimum of 1.5 acre-inches per acre of area drained shall be used. Sediment volumes from extraneous areas shall also be accounted for in the design.

Each waste retention structure serving confined feeding facilities with dry weather flows (other than overflow waterers) shall provide for the volume of sludge generated in a 20-year period from the design waste volumes and characteristics of the dry weather flows.

Sediment/sludge accumulation rates shall account for the sediment/sludge removal rates of any removal systems

preceding the waste retention structure. The designer shall propose removal rates for Department approval.

(II) Protection against liner damage

For those facilities where an evaluation of liner damage potential is necessary, a volume shall be added to the design of the structure to protect the soil liner from drying out or to protect the impermeable synthetic membrane liner from wind and hail damage. The volume shall be sufficient to ensure at least three feet of liquid, sediment, soil cover, and sludge accumulation is left in the structure, above the top of the liner, when the structure is dewatered to the December 1 operating level.

(III) Process Waste (Dry Weather Flows) Volume

Each waste retention structure receiving dry weather process wastes (for example overflow waterer discharges, milking parlor wastes, free stall alley flushes, silo liquors, and swine building flushes) shall provide for the volume (including bedding and litter, if flushed into the waste collection system) of dry weather process waste equal to or greater than that produced in a period of 120 days.

The volume may be reduced by up to 20% if the dry weather process wastes contain significant amounts of settleable solids and the flow passes through a process waste sediment basin or solids separator before entering the waste retention structure. In the case of recycle systems, net volumes may be considered.

(IV) Net Wintertime Precipitation Inflow and Evaporation Volume

Each waste retention structure shall provide for a volume of at least 120/365 of the sum of the volumes produced from the following calculations:

(A) The average annual runoff from the contributing drainage area,

(B) The average annual precipitation on the structure, and

(C) The average annual evaporation loss from the water surface in the structure (this will be a negative value).

If the sum is calculated as a value of less than zero, then

the value zero shall be used.

For estimating the volume due to precipitation on the structure, the area at the top of the structure shall be used.

For estimating evaporation loss, the water surface area corresponding to the December 1 operating level of the retention structure(s) may be used. The evaporation loss shall be calculated using evaporation rates no greater than 70% of the lake evaporation for the county where the facility is located (lake evaporation values for many Kansas counties may be obtained through the County NRCS Field Office).

(V) Storm Water Volume

Each waste retention structure shall provide for a volume equal to the runoff resulting from the design storm over the contributing drainage area plus the design storm rainfall on the structure.

The Department will set required operating levels in the permit and the designer should refrain from indicating any required operating levels in the design documents. When setting the required operating levels, the Department will include all facility runoff including any extraneous area runoff that has not been diverted away from the runoff collection system. [If NRCS methods are used to determine runoff volumes, then a runoff curve number of 90 will be used for all unpaved lots, pens, feeding alleys, and roads. A runoff curve number of 97 will be used for roofs and all paved (concrete and asphalt) areas.] All (100 percent) of the design storm precipitation will be used on the retention structure area.

(VI) Biological Volume Calculations

(A) General

Some confined feeding facilities generate waste that contains negligible amounts of dilution water from runoff, wash down, flushing, etc. and therefore, have highly concentrated waste. These are primarily facilities with confinement buildings such as swine facilities (with pull-plug systems and/or recycling of wastewater), and dairies with freestall barns.

Waste retention structures for these types of

facilities can be sources of odor and complaints. Due to the high strength of the waste there is very little beneficial, odor reducing, biological activity in the waste. Therefore, the designer of each waste retention structure for these types of facilities is strongly encouraged to include significant amounts of freshwater, for dilution, in the design. By including capabilities and capacity for dilution of the waste, biological activity will more readily occur to hasten the degradation/mineralization of the waste at ambient temperatures.

Each waste retention structure designed to include a minimum biological volume to promote ambient temperature digestion shall be sized to always maintain the biological volume while reserving capacity for other waste volumes required to be contained.

(B) Dilution Water

A supplemental water source, to maintain an adequate volume and to dilute waste inflows to promote ambient temperature biological activity, shall be provided. The supplemental water source may be either a surface or groundwater supply. The source should be capable of delivering sufficient water to maintain the volume necessary to promote a sufficient amount of biological activity. As part of the design for dilution water the designer shall consider periods of peak evaporation. The design documentation shall include an operational section identifying supplemental water sources and requirements, and a discussion of the methods to be employed to initially establish, and to maintain, the minimum water volume to promote biological activity.

(C) Required Volume for Biological Activity

Single stage waste retention structures and primary cells in designs for multi-cell waste retention structures intended to promote biological treatment shall be designed for a daily loading rate not to exceed the pounds of volatile solids (V.S.)/1000 $ft.^3$ of retention structure volume listed in the following table shown for each county in Kansas. The values shown were

interpolated from Figure 10-22 Anaerobic Lagoon Loading rates by the United States Department of Agriculture, Natural Resources Conservation Service, revised June 1995, Part 651, Agricultural Waste Management Field Handbook.

Biological Loading for Retention Structures: Pounds of Volatile Solids/Day/1000 Cubic Feet

Allen	5.2
Anderson	5.1
Atchison	4.7
Barber	5.3
Barton	4.9
Bourbon	5.2
Brown	4.7
Butler	5.2
Chase	5.0
Chautauqua	5.4
Cherokee	5.4
Cheyenne	4.6
Clark	5.2
Clay	4.8
Cloud	4.7
Coffey	5.1
Comanche	5.3
Cowley	5.3
Crawford	5.3
Decatur	4.6
Dickinson	4.9
Doniphan	4.7
Douglas	4.9
Edwards	5.1
Elk	5.3
Ellis	4.8
Ellsworth	4.9
Finney	5.0
Ford	5.1
Franklin	5.0
Geary	4.9
Gove	4.8
Graham	4.7
Grant	5.1
Gray	5.1

Greeley	4.9
Greenwood	5.2
Hamilton	5.0
Harper	5.3
Harvey	5.1
Haskell	5.1
Hodgeman	5.0
Jackson	4.8
Jefferson	4.8
Jewell	4.6
Johnson	4.9
Kearny	5.0
Kingman	5.2
Kiowa	5.2
Labette	5.4
Lane	4.9
Leavenworth	4.8
Lincoln	4.8
Linn	5.1
Logan	4.8
Lyon	5.0
Marion	5.0
Marshall	4.7
McPherson	5.0
Meade	5.2
Miami	5.0
Mitchell	4.7
Montgomery	5.4
Morris	4.9
Morton	5.2
Nemaha	4.7
Neosho	5.3
Ness	4.9
Norton	4.6
Osage	5.0

Osborne	4.7
Ottawa	4.8
Pawnee	5.0
Phillips	4.6
Pottawatomie	4.8
Pratt	5.2
Rawlins	4.6
Reno	5.1
Republic	4.6
Rice	5.0
Riley	4.8
Rooks	4.7
Rush	4.9
Russell	4.8
Saline	4.9
Scott	4.9
Sedgwick	5.2
Seward	5.2
Shawnee	4.9
Sheridan	4.7
Sherman	4.7
Smith	4.6
Stafford	5.1
Stanton	5.1
Stevens	5.2
Sumner	5.3
Thomas	4.7
Trego	4.8
Wabaunsee	4.9
Wallace	4.8
Washington	4.7
Wichita	4.9
Wilson	5.3
Woodson	5.2
Wyandotte	4.8

iii. Evaporation Volume Calculations

A water budget may be used to determine a retention structure volume and surface area sufficient to theoretically evaporate the process wastes (runoff as well as non-runoff related). The waste retention structure volume shall include an allowance for sediment and process solids buildup from runoff and process wastes. The design shall include a volume equivalent to the runoff from the design storm from all areas contributing runoff to the system. The system shall include land application capabilities as required in Evaporative Utilization (see page 46).

b. Non-earthen (Free Standing) Structures for Liquid Wastes

Each freestanding structure shall be designed to be totally emptied at least once per year. Each freestanding structure should be designed to exclude all precipitation and shall be designed to exclude all runoff from extraneous areas. The structure shall be designed to allow removal of the wastes from several locations unless the structure is designed to drain to a central sump or withdrawal point.

Each freestanding structure shall be designed to exclude any surrounding soil moisture.

Each freestanding structure shall be of professional design and capable of withstanding the anticipated loads and stresses from the intended use at the intended location. Prior to commencing operations of each tank, a certification that the storage structure was installed consistent with the designer's and, if appropriate, the manufacturer's specifications, shall be provided to the Department by the owner. If a professional engineer licensed to practice in Kansas or an approved consultant monitored or observed the construction, then the professional engineer or consultant shall also sign the certification. Professional Engineers, designers, planners, approved consultants, and persons using these Design Standards shall be familiar with the requirements of K.S.A. 74-7001 *et seq.* (unlawful practice of a technical profession).

Each freestanding structure shall have a minimum freeboard of 6 inches.

Each freestanding structure shall be designed to contain 120 days of dry weather waste flows plus the runoff resulting from a design storm precipitation event on any areas of the facility that drain into the freestanding structure.

i. Concrete Tanks

Each concrete manure tank shall be constructed with reinforced concrete. The sidewalls and bottom of each tank shall be a minimum of 6 inches thick.

ii. Tanks constructed of Metal, Fiberglass, and Other Structural Materials

Several manufacturers provide prefabricated storage structures such as stave concrete silos, epoxy lined metal tanks, etc. The manufacturer's specifications including installation and testing recommendations and requirements shall be provided to the Department with the permit application.

3. Solid Waste Storage Structures/Areas

a. General

Solid waste storage structures/areas receive scraped or mechanically deposited manure, bedding, litter, etc., for temporary storage before: land application, composting, or final use or disposal.

b. Design Criteria

i. Each solid waste storage structure/area shall be sized to store the expected accumulation of manure, bedding, and litter. In addition, unless the structure/area is located such that precipitation on the storage area is directed to a waste retention structure, each solid waste storage structure/area shall include capacity for direct precipitation from the design storm on the structure/area plus a one-half (½) foot of freeboard.

ii. Each solid waste storage structure/area shall be designed to exclude extraneous drainage from entering the storage structure/area.

iii. The combined volume of solid waste storage structures/areas, other associated solid waste storage structures/areas and temporary solid waste storage structures/areas, of each confined feeding facility, must have the capacity to contain the manure produced by the facility over a 120 day period.

iv. Any leachate and/or contaminated runoff from any solid waste storage structure/area must be controlled in a manner to prevent the creation of a significant water pollution potential. If necessary, control structures shall be built to detain any leachate or

contaminated runoff.

4. Hoop/Deep-Bedded Structures

a. Description

Deep-bedded structures are partially or totally enclosed units for housing livestock. The units utilize absorbent material (hay, stover, fodder, or straw) spread throughout the floor of the unit. The deep layer of absorbent material soaks up the liquid portion of the manure and dries the semi-solid portion of the manure so the animal excrement can be managed in dry or solid form. The livestock may be located on the same level as the absorbent or above the absorbent material on slatted or supported wire flooring. Some common names of deep-bedded structures are Hoop Buildings and High-Rise Houses.

b. General Design Standards

Deep-bedded structures shall meet the same groundwater separation distance and seepage control requirements as waste-retention lagoons or ponds (see K.A.R. 28-18-17 and K.A.R. 28-18a-33). Deep-bedded structures using synthetic liners shall be designed to protect the synthetic liner from damage by the livestock being housed and the manure removal equipment.

Manufacturer specifications, including installation and testing requirements and guidelines, shall be provided to the Department with the permit application. Prior to commencing operations at the site, a certification that the structure has been installed in a manner consistent with the manufacturer's specifications shall be provided to the Department by the facility owner. And, if a professional engineer licensed to practice in Kansas or an approved consultant observed or monitored the construction, then the professional engineer or consultant shall also sign the certification.

c. Deep-Bedded structures using dirt floors

i. Liner Standards

Each deep-bedded structure using soil for the structure floor shall have a soil liner at least one foot thick. The designer of each deep-bedded structure using a soil floor shall use an assumed water depth of one foot (hydraulic gradient of two) to determine if the seepage rate for the one-foot thick soil liner is at or below the required seepage criterion. The designer should address the protection of the soil floor from livestock and manure removal equipment in the design. Additional liner thickness, increased compacted soil density, soil cement, crusher fines, or other effective methods of protection should be considered.

ii. Site Drainage

Each soil liner should have a small uniform finished grade from the sides to the center and from one end to the other. The design of the structure shall ensure roof and other extraneous drainage is prevented from running into the inside of the structure. Roof gutters, lined drainage channels, site-grading sloping away from the structure, or other effective methods shall be used.

5. Other Structures Not Typically Used in Kansas

From time to time, situations arise which may call for innovative use of methods or structures for waste management used in other industries but not covered in these standards. Examples include: waste treatment methods such as aerobic lagoons, mechanically aerated lagoons, digesters (methane gas production systems), etc. The Department will consider each method for approval on a case-by case basis. Complete design documentation showing technical references shall accompany the plans and shall describe how the proposed method will provide a level of protection consistent with the intent of these standards and applicable federal and state laws and regulations.

E. Grass Filter Systems

The purpose of a grass filter system is to protect water quality by removing significant amounts of pollutants contained in feedlot runoff and thereby minimize the discharge of pollutants for most storm events. These systems use a combination of processes such as deposition, adsorption, infiltration, absorption, volatilization, direct nutrient uptake by plants, and natural decomposition to remove pollutants from the feedlot runoff. Grass filter systems are not suitable for facilities producing wastewater on a routine or daily basis unless special provisions are taken.

Grass filter systems are not suitable for most confined feeding facilities. Suitability depends upon the facility size, physical setting, runoff characteristics, annual precipitation, frequency, duration, and intensity of precipitation and the management capabilities of the feedlot operator. Grass filter systems are more likely to be successful when these criteria are carefully considered. A general statement regarding the use of grass filter systems is that in eastern Kansas: they should only be considered for small feedlots (1 acre or less). However in western Kansas a grass filter system may be suitable for use at a larger feedlot (up to 6 acres or 999 head).

The design of each grass filter system serving less than 300 animal units should be based upon the Kansas NRCS practice standards for waste treatment strip. The design of each grass filter system serving 300 to 999 animal units should use the same practice standard but may be required to take additional measures and will only be considered by KDHE on a case-by-case basis. The use of a grass filter system for any facility with 1,000 or more animal units will be evaluated on a case-by-case basis and shall demonstrate the ability to

meet the EPA criteria for Voluntary Alternative Performance Standards, 40 CFR 412 Subpart C and D.

Grass filter systems usually consist of at least three components: solids removal component (typically a sediment basin), a flow distribution device and a grass filter area. The "filter" is an area of perennial grass used to reduce sediment, organic waste, nutrients and other pollutants from stormwater runoff from confined feeding facilities. The performance objectives of each component are:

1. Solids Removal

    a. Remove the majority of the settlable solids from the runoff.

        i. For a Sediment Basin

            (I) Have the capacity to store the average annual sediment yield from the lot.

            (II) Control lot runoff to induce the settling or deposition of solids and nutrients.

            (III) Provide controlled outflow to the flow distribution system.

            (IV) Control the design storm rainfall event without overtopping or having an uncontrolled discharge.

            (V) Facilitate maintenance, especially the removal of accumulated sediment.

2. Flow Distribution System

    a. Uniformly distribute remaining solids and runoff onto the grass filter area.

    b. Provide control of the velocity and flow to meet hydraulic performance criteria required for the filter area.

3. Grass Filter Area

    a. Infiltrate the runoff resulting from a 2-year, 24-hour storm event and the direct rainfall on the filter area. The soil in the filter area shall be a minimum of 2 feet deep. The available water capacity of the soil shall be assumed to be 50% before the design storm occurs.

    b. Control the runoff resulting from a design storm rainfall event such that:

i. all flow is contained within the filter area,

ii. flow depth does not exceed 6 inches, and

iii. average velocity does not exceed 1.5 ft./sec.

c. Ensure that contact time (i.e. travel time) for the runoff from the 2-year, 24-hour storm through the filter area is at least one hour.

d. Ensure uniform sheet flow by utilizing methods such as dividing the filter into borders having a maximum width of 50 feet.

e. distribute and apply nutrients at agronomic rates.

F. Livestock Truck/Trailer Washes

1. General

The design of each Livestock Truck/Trailer Wash (LTTW) should be based upon site-specific information whenever possible rather than the general criteria provided below. These criteria are intended for use in the design of truck washes serving only equipment used to confine livestock for transport. Any other type of truck/trailer wash or a combined washing facility serving livestock truck/trailers and other types of trucks/trailers or vehicles are required to meet other requirements not addressed by these standards.

Each waste management system for a LTTW facility should consist of some or all of the following components: wash water collection area, solid separation and/or storage (sediment basin, mud trap, etc.), wastewater storage, and waste utilization.

2. Design Criteria

a. Each settling basin used for LTTW waste should be sized for at least 30 minutes detention time at the maximum anticipated flow rate.

b. Each settling basin used for LTTW waste should, at a minimum, be sized to provide storage for 10 ft^3 of solids per truck washed times the number of livestock truck/trailers washed in one month.

c. All onsite storage of LTTW solid wastes, other than that provided in a settling basin or waste storage structure must be sized to hold 120 days of solids. All runoff from each onsite LTTW solid waste storage site must be directed to the wastewater storage structure.

d. Minimum wastewater storage shall be designed as provided in the Liquid Waste Retention Structure section of these Standards. If actual quantities or book values are not available, a minimum storage volume of 270 ft^3 of

wastewater per truck/trailer washed shall be provided.

e. In the absence of site specific analysis of the nutrient content of the wastewater, the land utilization or land application area may be estimated using 0.008 acre for each truck washed annually for liquids disposal area and 0.027 acre for each truck washed annually for solid disposal area. Waste application rates shall not exceed agronomic rates.

G. Public Livestock Markets

From a hydraulic or drainage standpoint, waste systems for public livestock markets shall adhere to the design requirements for confined feeding facilities contained herein. For nutrient utilization, however, the design shall be based on the expected average annual number and type of animals to be sold by the market. Nutrient loads shall be determined for each animal type represented, taking into account the average number of days and/or hours the animal would be present at the facility. The various waste loads shall then be aggregated. Book values may be used in determining the waste loading.

Nutrient loadings for existing public livestock markets shall be computed utilizing the average annual number and type of animals sold by the market during the past five calendar years, taking into account the average number of days and/or hours the animal(s) are present at the facility.

H. Composting Operations

All contaminated leachate and runoff must be controlled in a manner preventing the creation of a significant water pollution potential. If necessary to prevent violations of water quality standards, structures shall be built to control the runoff. The "Kansas Agricultural and Related Waste Control Permit" for each facility will include those composting areas draining to the waste retention structures within the boundary of the facility. Composting operations, and any associated waste control structures, outside the drainage control area for the waste retention structures permitted in the "Kansas Agricultural and Related Waste Control Permit" shall be subject to the Bureau of Waste Management regulations, permitting, inspection and oversight (See K.A.R. 28-29-25c and 25d).

V. Construction

A. Required Construction Time Frame(s)

1. Newly Proposed Construction

Construction initiation and completion of approved new facilities or expansions of existing facilities shall adhere to the time frames in K.A.R. 28-18-12 (e) and/or K.A.R. 28-18a-12 (e). Failure to initiate and complete the approved construction in the appropriate time frame(s) shall void the Department's approval of the

construction plans, specifications, and other associated plans.

2. Voided Approval/Resubmitting Plans

In cases where the Department's approval becomes void due to a construction time frame failure, the permit or permit modification shall remain in effect for the term of the permit. If the applicant desires to construct the proposed facility or facility expansion after the approval has become void, the previously approved construction plans, specifications, and other associated plans may be resubmitted for review and approval, but must include any modifications to meet current requirements. The applicant shall not initiate construction or expansion prior to the Department's approval of the resubmitted plans.

B. Modifications and Changes

There shall be no significant deviation from the plans approved by the Department unless amended plans showing the proposed changes are submitted and approved. A significant deviation or change includes:

- Expansion or enlargement of the facility beyond the scope or boundaries established by registration, permit, certification or approved plans and specifications;
- Any increase in the animal unit capacity beyond that authorized by a permit or certification; or
- Any change in construction or operation of a confined feeding facility that may affect the collection, storage, handling, treatment, utilization, or disposal of animal or other process wastes.

C. Erosion and Sediment Control

If required, the permittee shall obtain NPDES permit coverage for stormwater discharges during construction activity.

D. Discoveries During Construction

If an active, abandoned, or plugged water, oil or gas well, pipeline or similar feature is found within any area of excavation, and the approved design for the confined feeding facility has not addressed the closure of the well, pipeline, or feature, then the permittee shall notify the Department within 48 hours of the discovery. Construction activities in the vicinity of the well, pipeline, or feature shall immediately halt and shall not resume until authorization to proceed is given by the Department.

If a discovery necessitates changes to the approved plan, proposed changes shall be submitted for review and the changes shall not be implemented until approved by the Department. Any approved modifications shall be incorporated into the permit upon renewal.

Any discovery of an unmarked burial site shall be dealt with according to K.S.A. 75-2741

et seq. (Kansas unmarked burial sites preservation act).

E. Soil Liners

Care should be taken not to allow soil liners to dry out during and after construction. Cracked soil liners must be repaired prior to permeability testing or acceptance by the Department. If a soil liner is to be employed soil sampling and analysis for the design of the soil liner shall be conducted during the subsurface investigations required as part of the Site Location Considerations, and Minimum Design of Wastewater Control Structures - Criteria for Earthen Structures sections of the Design Standards.

F. Liner Testing

1. General

Construction observation and testing is required for each waste management structure required to be watertight or to control seepage to below established requirements. The level of observation and testing of the construction of the waste management structure shall be proportional to the level of risk the waste management structure presents to public health and the environment. The permittee shall consider the following major factors and the effect of each factor on the level of observation and testing:

a. Depth to groundwater; as the groundwater level gets closer to the waste structure floor the amount of resources directed toward construction observation and testing should increase;

b. Structure location relative to Sensitive Groundwater Areas; the construction observation and testing should be greater for wastewater structures located in sensitive groundwater areas; and

c. Soil liner material; as the soil liner material become less suitable for controlling seepage the level of resources directed toward construction observation and testing should increase.

d. Liner Size; as the amount of waste contained increases the area of the liner increases and the greater the effect will be if the liner is inadequate.

e. Cost, as the cost of the project increases it becomes more important to expend effort on construction observation and testing to ensure a quality product is received.

2. Observation and Testing Methods

Any of the following methods may be utilized by the permittee unless the Department specifies a particular method to be used to address site-specific public health or environment concerns.

a. Methods for Any Type of Liner

The whole pond seepage test as described in ASAE Paper Number 034130 is suitable for testing impermeable synthetic membrane liners or soil liners.

b. Methods for Impermeable Synthetic Membrane Liners

Use methods recommended by the liner manufacturer. The manufacturer specifications, including installation and testing protocols, shall be provided to the Department with the permit application.

c. Methods for Soil Liners

i. Core Samples.

(I) The permittee shall notify the Department at least 48 hours in advance of obtaining any core samples in order to provide the Department with an opportunity to observe the sampling procedures.

(II) One core sample shall be taken for each acre or part thereof, for each lift of the area bounded by the contour representing the maximum anticipated wastewater level. Each liner shall be treated separately in determining the number of samples. Sampling points shall be uniformly distributed throughout the liner area when multiple samples are required.

(III) Each soil core shall be representative of the lift and shall penetrate the full thickness of the lift. Each sample shall be a discreet sample and shall not be mixed with other samples. Each sample shall be a complete unified mass or the sample shall be rejected. There shall be no remolding of the sample in the field or in the laboratory. The sample shall be collected in accordance with ASTM D-1587 and preserved in accordance with ASTM D-4220. All holes resulting from the liner sampling shall be repaired to the same criteria as the soil liner. (For example, the area over excavated, scarified, filled with suitable liner materials, and compacted in successive lifts. As an alternative each test hole may be backfilled with 2-inch layers of compacted bentonite to the full lift thickness).

(A) The soil cores shall be tested using ASTM D-

5084 methods. The permittee shall use a laboratory familiar with and experienced in using ASTM D-5084 methods. The permittee shall consider the use of a laboratory accredited to perform the specified test and which meets the requirements for ASTM D3740.

ii. Construction Oversight Method

(I) Five rapid soil moisture content tests shall be taken for each acre of area of each lift bounded by the contour representing the maximum anticipated wastewater level. Each liner shall be treated separately in determining the number of samples.

(II) Acceptable ASTM rapid water content test methods include: D-3017, D-4643, D-4944, and D-4959. A duplicate sample shall be taken for every tenth sample in order to minimize the chance for undetected systematic errors in the testing. The duplicate will be analyzed using ASTM D-2216.

(III) Five rapid soil density tests shall be taken for each acre of each lift bounded by the contour representing the maximum anticipated wastewater level. Each liner shall be treated separately in determining the number of samples.

(IV) Acceptable ASTM rapid density test methods include D-2922 and D-2937. To minimize the chance for undetected systematic testing errors, a duplicate sample shall be taken for every 20^{th} sample. The duplicate shall be analyzed using ASTM D-1556, D-1587 or D-2167.

(V) Consideration shall be given to construction quality assurance testing such as core sample or whole pond test methods when the construction oversight method is employed.

d. The permittee may also propose and use any other methods approved by the Department.

3. Testing Records, Summary, and Certification

With the exception of the whole pond test method, liner test results shall be submitted to the Department within sixty days (60 days) of completion of each liner. The permittee shall not stock the facility or portions of the expanded facility with livestock until the Department has accepted the testing results. Should any structure not meet the requirements to be watertight or control seepage to levels below requirements, then additional sealing or protection measures will be required.

If an impermeable synthetic membrane liner is to be installed, the designer shall consider requiring the sub grade for the ISML to be prepared in a manner equivalent to the requirements for soil liners. If the ISML sub grade is prepared in the same manner as a soil liner then the sub grade shall be tested upon completion and the test results shall be submitted and approved by the Department prior to the placement of the synthetic liner.

The level of information submitted with each liner testing report and certification shall be commensurate with the level of risk the waste retention structure presents to public health and the environment.

Testing results for soil liners and ISML sub grades constructed to meet soil liner requirements shall be submitted in a concise and organized format. The test results shall be grouped by each lift of each soil liner. Core sample test results shall include seepage calculations based upon permeability testing results, liner thickness, and the design hydraulic gradient. The results for each liner shall include failing tests results, if any, along with a description of reconstruction activities and final passing test results. Where more than one liner is being constructed the test results for each liner shall be reported separately.

A completion certification, and when requested any supporting documentation, shall be submitted to the Department by the permittee. The permittee shall certify that the animal waste management system was constructed in accordance with the plans and specifications approved by the Department. For facilities that utilized an approved consultant or engineer to observe the facility construction, the consultant or engineer shall also sign and submit the certification. For ISML the completion certification shall include a certification from the liner manufacturer and liner installer that the ISML was manufactured and installed in compliance with the manufacturer's requirements.

VI. Operation and Maintenance

A. Initiating Operations

The stocking of a new confined feeding facility or expanded portion of an existing facility

shall not be initiated until the Department has accepted and acknowledged the construction certification.

B. Required Retention Structure Operating Levels

Most retention structures are required to have maximum and sometimes a minimum operating level or range as stated in the facility's permit. The level will be measured from the lowest point on the top of the berm and/or referenced to the bottom of the retention structure and will be stated in feet.

Usually, facilities with daily flows will have a required regular or daily operating level and/or a December 1st or winter operating level. Facilities without daily flows generally have only a regular or daily operating level. Facilities with a minimum biological volume will have the volume level stated in their permit in addition to other required levels.

A staff gauge or other water level measurement device shall be maintained in working order in each waste retention structure utilized by the permittee to meet waste containment requirements.

C. Solids Handling

1. Sedimentation Basins

a. Runoff Sedimentation Basins

Each runoff sedimentation basin shall be cleaned whenever the solids accumulation exceeds one half of the design depth of the basin. Frequent solids removal will extend the life of the retention structure and reduce the need to frequently remove solids from the retention structure.

b. Process Waste Sedimentation Basins

Each process waste sedimentation basin shall be cleaned on a schedule consistent with the basin design.

2. Retention Structures

Each retention structure shall be cleaned of solids accumulation whenever the accumulation infringes on the required storage depth.

3. Open Lots

Each open lot should be scraped or cleared of manure, bedding, etc., after each cycle. Manure accumulations should be minimized during summer months or dry periods to minimize off site deposition of dust and manure which will become water pollutants when the next rain occurs.

4. Stockpiling

On-site stockpiles shall be located such that runoff is controlled and directed to the waste management system. Manure solids may be stockpiled in occupied pens. The use of off site stockpiles should be minimized and if used they must be located and managed in a manner that does not create a significant water pollution potential. Off-site stockpiles should be removed or utilized within six months and the stockpile area reseeded. Off site stockpiles should not be located at the same site in two consecutive years.

D. Waterers

Malfunctioning waterers shall be repaired in a timely manner such that excess flows do not impact the waste control system.

E. Erosion and Liner Protection

Perennial grass or other erosion control measures shall be maintained on: the inside slopes of earthen retention structures above the maximum water level, berms, and on the back slopes of all newly constructed or expanded earthen structures or channels.

Trees and/or other deep rooted vegetation must not be allowed to grow within 100 feet of the outside toe of any earthen structures used to contain liquid wastes.

Fencing or other means shall be utilized to prevent animals from accessing or disturbing earthen liners.

A liquid or soil cover shall be maintained over soil liners to prevent the liner from drying out and crack and thus creating an unnecessary risk for liquid wastes to escape from the retention structure.

Any mechanical or structural damage to any soil liner shall be reported to the Department within two workdays of the discovery and shall be repaired in a time frame approved by the Department.

Any erosion or mechanical damage to any portion of the waste control system shall be repaired in a timely manner. All repairs shall conform to the approved plans and specifications.

VII. Waste Utilization

A. Land Application

Waste may be applied to agricultural land by any method that will result in uniform application of the material and that does not exceed agronomic rates. Liquid wastes shall be applied at agronomic rates and at rates less than or equal to the soil intake rates and the

soil moisture deficit.

Wastes shall not be applied:

- To any area within 100 feet of any down-gradient surface water, open tile line intake structure, sinkhole, agricultural wellhead, or other conduit to surface waters. The required distance may be reduced to 35 feet, if a permanently vegetated buffer is established where applications of manure, litter, or process wastewater are prohibited.
- As a liquid, when soil is frozen, snow-covered or saturated, or during a precipitation event, unless approved in advance by the Department. (Solid wastes may be applied to frozen ground if measures are taken to ensure that the wastes will be retained at the application site.)
- At rates which allow the wastes to leave the land application site or property.
- To any area subject to active erosion, especially gully erosion.
- To fields having 1/3 or more of the soils classified as highly erodible land (HEL) relative to water erosion, unless a conservation plan for the field has been adopted and implemented. See the NRCS Field Office in the county wherein the field is located for HEL information.

B. Application Equipment

The waste application equipment shall be sufficient to operate and manage the waste control system as designed. Systems storing and handling liquid wastes shall maintain application equipment capable of applying the ten (10) day wastewater accumulation volume and the design storm volume, in ten twelve-hour operating days. For center-pivot sprinkler systems, 24-hour operating days may be considered when determining the required minimum application rate of the system.

Waste application equipment is to be owned, contracted, leased or under a use agreement. If application equipment is not immediately available, then, in order to ensure dewatering within 10 days, the delivery capacity of the equipment must be greater than that required in the previous section.

C. Sampling

When directed by the Department, sampling and analysis of wastes and/or waste application sites shall be conducted to confirm application of waste at agronomic rates.

D. Evaporative Utilization

Facilities that intend to utilize evaporation, as a disposal method, must develop a water budget to determine the extent to which evaporation can control liquid wastes. The design

shall take into consideration sediment accumulations, process waste, net inflow, storm water (from the design storm), freeboard and any design biological volume. The area required for land application of liquid waste shall be based on applying waste at agronomic rates. Application equipment capacity and land requirements will be the same as for conventional land application systems. Salinity and water quality testing shall be conducted on the wastewater in the storage structure as a condition of permit renewal to determine the suitability of waste material for land application.

VIII. Variance Procedure

A. General

This section is to allow for innovative solutions to confined feeding facility waste control systems and for unusual site-specific circumstances. Situations may arise which, because of engineering considerations, industrial practices, or new technology, may require a variance from the criteria published in these Design Standards. The Department of Health and Environment will consider each request for variance from these Design Standards on a case-by-case basis. Each request for a variance shall justify the need and show how the variance will protect the surface and groundwater quality in a manner consistent with the intent of these Design Standards.

B. Procedure

Each request for a variance shall be submitted in writing to the Department and will address the following:

- The purpose of the requested variance and why it should be considered and granted.
- The requirement or requirements of this Design Standard for which the variance is requested.
- How the variance will be consistent with the intent of these Design Standards and protect surface and groundwater quality.
- Any other information the Department may require to process the request for variance.

The Department will respond to each request for variance in writing and either deny, grant, or conditionally approve the request.